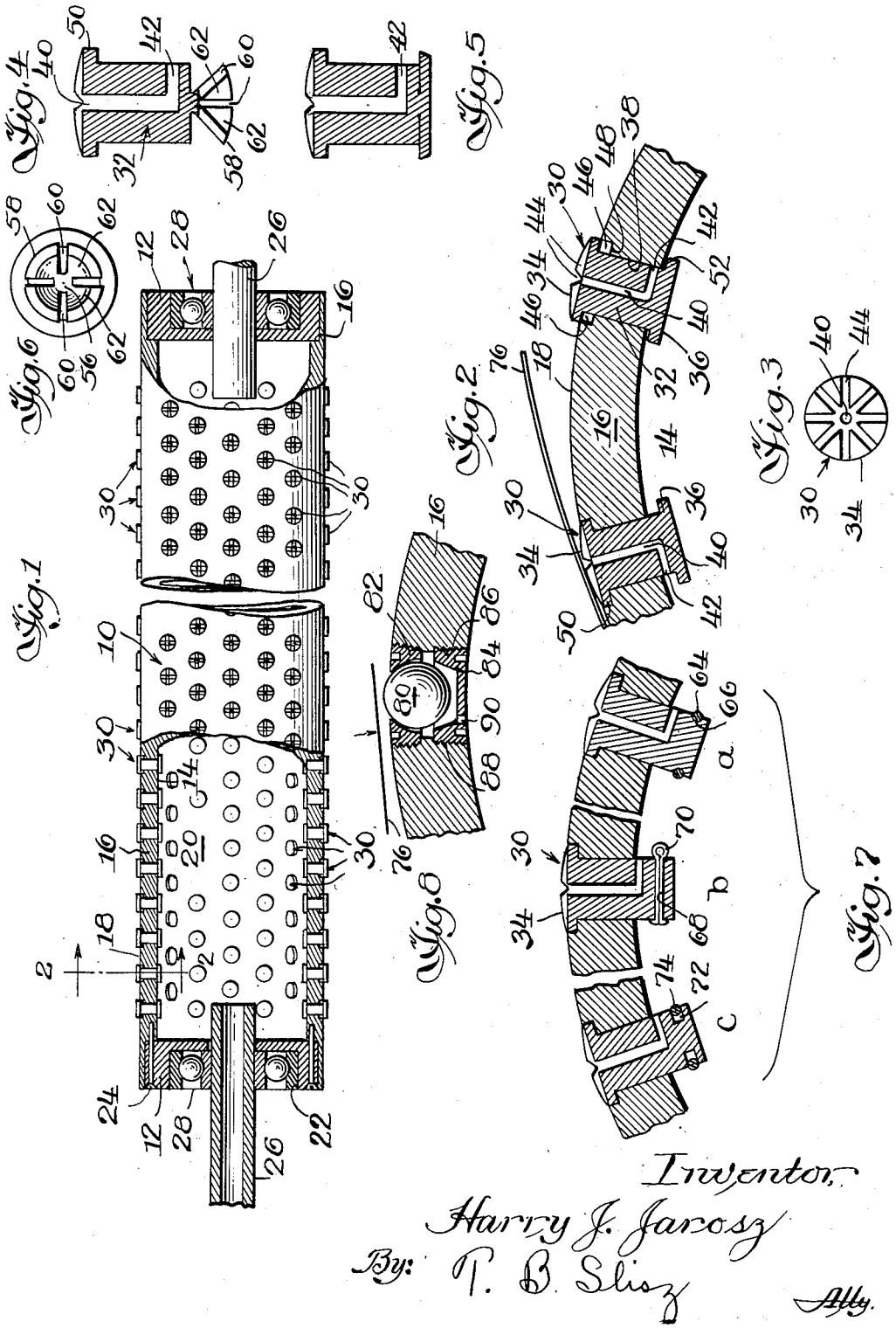
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APPARATUS FOR CONDITIONING WEBS

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# APPARATUS FOR CONDITIONING WEBS

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This invention pertains to an improved device for conditioning webs while moving through a machine. More particularly it is directed to the typographical arts in which freshly printed continuous webs of paper or textiles can be acted on by means of a gaseous reagent to accelerate drying of the ink and prevent smudging.

The typographical crafts have long been aware of the necessity to condition paper under controlled moisture and temperature to obtain a paper that is dimensionally stable and containing the proper amount of moisture for reception of inks. An unstable web of paper has a tendency to lengthen or shorten in linear measurement and also is adversely affected in its width. Obviously any printing done thereon, particularly in case or multi-color work, eventually deviates from alignment, weaves to and fro on the sheet, the various colors do not register exactly and considerable loss is incurred because the work is spoiled or unacceptable.

Even though dimensional stability should be attained in the paper through proper storage, the paper in the pressroom or while it is in the press may lose considerable of this stability because of the heated rollers, dryers and etc., and other accoutrements used in the typographical arts in connection with printing. These conditions are particularly accentuated in multi-color press printing and it is to this field of specialty that I particularly address my invention though clearly it can be used in other fields wherever it is necessary to condition a web or prevent smudging of ink upon contact with the rollers.

In machines of the type using rollers over which rides the web, the rollers may or may not be heated; some are used for calendering or imparting a finish to the surface of the web; others again are used solely as a means of support or as pivots about which the continuous web may change its direction of travel. Likewise some of the rollers may have a peripheral speed equal to the linear speed of the continuous webs while other rollers may have different or even variable speeds to achieve certain effects or speed control of the continuous web as it traverses certain portions of the press.

A freshly inked surface of the web is somewhat tacky and therefore heat or air is blown across such surface to "dry" it. However, the press is travelling at a high speed, and it is necessary that the freshly printed surface of the web must have at least a momentary contact with the peripheries of a number of rollers in the press. This momentary contact with the roller surface provides the opportunity for a slight adhesion of the web to roller and may cause under some conditions a slight elongation in the sheet. Since this elongation is accumulative and the adhesive contact is not always uniform across the sheet eventually and particularly in multi-color work, where uniformity of sheet travel and dimensional stability are important, the colors do not register with the result that off printing occurs and production losses occur. Likewise, static electricity is created, temperatures are increased and moisture in the paper is lowered and all



sorts of troubles have been attributed to this feature alone. Thus not only speed and production output becomes lower but also the high quality of the printing cannot be achieved because of the variables introduced by this factor alone.

In addition, there are a number of other factors mechanical and physical as well as chemical that continually plague a multi-color press operator during a press run. Therefore anything that will alleviate or overcome these difficulties is always welcomed.

A number of devices directed to prevention of adhesion of freshly printed surfaces, promotion of drying of the ink and prevention of ink smudging are described in patent literature. For instance the Henry A. Wise Wood, U. S. Patent 1,170,210 shows an air blower to promote drying. A certain Dausmann U. S. Patent 2,034,694 shows a hollow roller in which vacuum or air may be present to help in drying and prevention of ink smudging. A Zuckerman U. S. Patent 2,368,340 shows a series of hollow rollers with perforations in the periphery for exit of air. However, all of these depend on a continuous flow of air through the entire peripheral roller surface or through selected portions thereof.

My device differs in principle from all others. In my device, the conditioning fluid is allowed to flow only when the particular and specific area of the peripheral surface is contacted by the continuous web.

It therefore is an object of my invention to provide a process of conditioning continuous webs while they are in movement in a machine, and to retain their dimensional stability.

A further object of my invention is to provide a process for feeding a conditioning fluid at the point of contact between the continuous web and the roller.

A still further object of my invention is to provide a device to prevent ink smudging of the printed continuous web while in contact with the rollers.

An additional object of my invention is to provide a device that will deliver, upon contact with the continuous web, a conditioning fluid for the web or matter carried thereon.

A still further but not final object of my invention is to provide an economical and convenient process of making my device, and to provide for its easy and quick installation in present equipment without costly lay-overs and expensive alterations.

These and other objects, adaptations, variations, permutations and modifications will be clearly apparent and obvious to a person skilled in mechanical typographical arts, particularly in view of the hereinbelow description of a preferred embodiment of my invention, whose underlying principles are illustrated in the specific embodiment of a printing press roller for purely exemplary purposes and should not be construed as a limitation of the application of the broad fundamental principles underlying my inventive concept.

Therefore for reasons of clarity, my invention is shown in its specific application in connection with a roller that can be suitably employed either in a roller printing press of a single or multi-color type, or in connection with processing and printing of textile fabrics and felts. Therefore the annexed drawings forming a part of this disclosure are directed to the most simple modification of my invention and of its application in combination with a roller. For the same reasons, auxiliary equipment such as source of conditioning fluids (by which term is meant either a liquid or gaseous fluid) having therein various reagents and modifying materials to effect certain results in the web, etc. are not shown. Nor is the composition of the fluids described for obviously one skilled in the typographical arts is presumed to be fully familiar with these matters.

In the drawings—

Figure 1 is an elevation of a roll partly broken away to show the interior.

Figure 2 is an enlarged detail showing in section a part of the rim shell of the roller in contact with a web which has depressed a valve projection.

Figure 3 is a plan view of one type of a valve insert head.

Figure 4 is an elevation of the valve insert showing the position of the clinch rim to secure the valve insert in slidable juxtaposition within the rim shell.

Figure 5 is a view of the valve insert of Figure 4 with clinch rim pressed against the valve body.

Figure 6 is a bottom view of Figure 4.

Figure 7 shows several modifications by which the valve inserts can be locked in position.

Figure 8 shows a ball type valve as another modification of the valve insert.

In the drawings certain reference characters are used to identify elements thereon and these are used hereinbelow to likewise refer to the same elements.

My invention comprises a roller **10** whos sides are enclosed by annular end plates **12** to form therebetween and the interior wall **14** of the rim **16** of the said cylinder a chamber **20**. The ends of the rim **16** are provided with an internal annular recess **22**, into which the circular end plates **12** can be press fitted, welded or otherwise fixedly fastened therein. However, since it may be desirable to enter the cavity or chamber **20** at times, the illustrations show a machine screw **24** as the means to fasten the end plates **12** within the internal annular recess **22** of the rim **16**.

In at least one of the end plates **12** there is provided an opening through which a tube **26** or hollow shaft may extend partly within the chamber **20**. Or if desired the shaft **26** may span the interior and project from both sides of the roller **10**. The usual bearing members **28** with their raceways, etc. are provided to lessen friction of the spinning roller. For sake of simplicity only a freely rotating roller is illustrated though obviously a driven roller or a driver roller or any other type of equipment having a chamber can utilize my invention by slight modification well within the scope of a person skilled in this art.

The hollow shaft **26** is a conduit by which conditioning fluids formulated to impart certain characteristics in the web or to aid in drying the ink on the web, etc. are allowed to flow into the chamber **20**. From the chamber the fluid is fed through the outlets in the rim shell as needed by the web.

The term "fluid" as used herein is defined as being applied to either a liquid or gaseout fluid. These fluids may contain water, glycerine, alcohol or other reagents useful in conditioning or to obtain certain effects. The gas generally employed is air which may or may not be heated, contain steam or other vapors, ozone or oxygen to aid in drying of ink, etc.

Disposed about the peripheral surface **18** of the roller **10** in a preselected pattern in order to obtain uniform distribution of the conditioning fluid upon contact with the web, are a number of projecting orifices or nipples **30**. Essentially the nipple **30** is a valve insert mounted in slidable juxtaposition within an opening **38** in the shell **16**. The number of openings **38** as mentioned above depend upon a number factors, such as the quantity of the fluid to be dispensed, uniformity of distribution of the fluid wanted, pressure available in the chamber, the nature and type of conditioning fluids, etc. This can be readily determined by one skilled in this art.

The projecting orifice or nipple comprises essentially a valve shank or stem **32**, having at one end thereon a head **34** and on the other end a base **36**. As mentioned above, the shank **32** is mounted in a slidable juxtaposition within the openings **38** and obviously it should have a snug but not too tight of fit for it must be capable of acting as a valve slide to open and close the flow of fluid from the chamber **20**. Axially located within the shank **32** is a bore **40** which starts at the surface of the head **34** and extends inwardly for a suitable depth preferably slightly greater than the thickness of the shell rim **16**. At an angle to the base of the said vertical bore **40** there extends a lateral bore **42** which opens out on the wall of the shank **32** and joins the vertical bore **40** within the shank to create a passageway for the fluid from the chamber **20** to the top of the head **34** of the nipple **30**. The walls of the opening **38**, an integral part of the rim **16**, form the casing about the shank **32** and complete the valve structure. Thus when the valve stem **32** is depressed the lateral bore **42** communicates with the interior of the chamber **20**, and permits exit of any gas or other fluids therein to the surface of the head **34**. When the pressure on the head is removed, the internal pressure within the roller forces the shank to recede within the opening **38** and the lateral bore **42** is closed by the walls of the rim shell **16**.

The valve head **34** may have any desirable shape and just like the shank **32** may be round, square, etc. though obviously the round shap is preferred. The top of the head **34** is preferably but not necessarily curved to conform more or less with the curvature of the roller peripheral surface **18**. This may or may not be slotted with grooves **44**, which criss-cross through the top of the vertical bore **40** and function as distribution ducts for the fluid emanating from the bore **40**. Clearly other types of distribution means can be provided to serve the same function. In passing, one can mention, knurled surfaces, indentations, etc.

In order to prevent possible puncture by the upstanding nipple **30** of the web there is provided an annular or countersink recess **46** about each opening **38**. The floor of this countersink acts as a shoulder **48** upon which the rim **50** of the head **34** impinges and thus the valve stem or shank is prevented from falling or being forced into the chamber **20**. In use the head **34** is depressed within the countersink **46** and provides a uniformly curved surface for the web to lay on.

However, to prevent the falling out or forcible ejection of the nipples **30**, there is provided on the foot or base **36** of the stem **32** a detent **52**. This detent may take one of several forms as specifically illustrated in Figure 7, though the preferred form is specially illustrated in Figures 4, 5 and 6.

The preferred detent **52** is of the clinch rim type and is formed as an integral part of the stem foot **36**. A one-half V-shaped groove **54** is first formed preferably just below the lateral bore **42** around the stem foot **36**. Then a V-shaped recess **56** is drilled to a suitable depth to provide a hollow cone base below the lateral bore **42**. Two criss-crossing slits **60** are cut partially into the bottom of the cone **58** to form therein segments **62**. When the nipples **30** thus provided with segments **62** are inserted within the opening **38** in the rim shell **16**, the segments **62** can be clinched as shown in Figure 4 by any suitable means operating either within the roller **10** or by means of an anvil placed within the roller **10**, and hammering on the head **34** with sufficient force to bend the segments **62** to the desired position but without hindering the slidable movement of the valve shank **32** within the opening **38**.

Another suitable detent is a C-spring lock **64** which is inserted into a groove **66** about the end of the foot **36** as shown in Figure 6(*a*). If desired a hole **68** can be made in a suitable place below the lateral bore **42** in the foot **36** and a conventional cotter pin **70** employed to lock the valve stem **32** in slidable juxtaposition within the opening **38**. This variation is illustrated as (*b*) in Figure 6. Likewise Figure 6, variation (*c*) illustrates another type that can be used with a lateral bore **72** in which a helical spring **74**, held in a fixed position about its midpoint by a pin. The spring **74** when compressed

fits within the diameter of the foot 36, but when it is released it expands and projects outwardly from each end of the hole 72.

In operation while mounted in a machine, suitable pressure outside of the roller 10 is communicated by means of the fluid to the chamber 20 through the hollow shaft 26. This pressure acts on the base or foot 36 of each nipple 30 and forces each nipple 30 into an upright position and projecting above the surface 18 of the rim 16. The nipples 30 are restrained from popping out by means of the detent 52. As the web 76 contacts the head 34 of each projecting nipple 30, it depresses the head and the shank or stem 32 until the rim 50 of the head abuts against the internal annular shoulder 48. At this point, the entry to the lateral bore 42 in the shank 32 previously in slidable contact with the walls of the rim shell 16, becomes exposed and in communication with fluid within the chamber 20. This fluid under pressure escapes from the chamber 20 through the lateral bore 42, into the vertical bore 40 and emerges at the head 34 contacted by the web 76. Since the surface of the head 34 is provided with channels 44 communicating with the bore 40, the fluid escapes over the head 34 to act on the surface of web 76. The web 76 is constantly "fluttering" out of contact with the peripheral surface 18 of the roller 10 because of the pressure of the escaping fluid. Thus any freshly printed indicia area on the web is substantially out of contact with any large surface area on the roller. This results in practically no smudging, better register and alignment and increased productivity of a higher quality printed product.

Another modification or species of the principles underlying my invention are illustrated in Figure 8 in which a suitable ball 80 made of highly polished steel or certain types of plastic materials like nylon, Bakelite or the like, are retained within suitable raceways 82 and 84. The ball retaining raceways 82 and 84 may, if desired, be inserted into a sleeve (not illustrated) and the entire sleeve may be held in position by the female threads 86 formed within the aperture in the rim 16. However, the modification illustrated consists of split ball raceways comprising an upper section 82 and a lower section 84. Both sections have male threads 88 thereon which are engaged by threads 86 formed within the walls of the aperture or openings 38. The ball 80 is held loosely between the curvilinear interior surfaces of the raceway sections 82 and 84, so that air or other fluid may flow freely about the ball as it enters through the orifice 90 in the lower raceway section 84, from within the hollow of the roller and retain the said ball 80 tightly against the upper raceway 82 by means of its pressure. As the pressure is decreased or as the top of the ball 80 protruding above the surface of its upper raceway 82 and above the rim surface 18 is contacted by the web 76, then it is depressed and the fluid will emerge about the spherical surface of the ball 80 to play against the under surface of the web 76.

It should be noted that this orifice 90 is disposed to one side of the ball 80, or can be drilled angularly through the bottom raceway section 84 in order that any gaseous or liquid fluid emerging from it will strike the surface of the ball 80 tangentially and cause it to rotate or spin. Thus the surface of the ball in contact with web 76 will not only roll with the motion of the web but also will be spun under the influence of the fluid emerging through porthole 90. Though not illustrated, it is understood that suitable means are provided within the raceways sections by which a suitable face spanner wrench can insert or remove the same without difficulty into the rim openings 38.

Obviously the above disclosure is only an illustration of the specific application of the fundamental concepts underlying my invention which can be applied with equal effectiveness to other application without departing from the spirit of my invention as defined in the hereunto appended claims.



I claim:

1. A roller comprising a tubular cylinder with a periphery having openings therein, walls enclosing ends of said tubular cylinder to form therein a chamber, conduit for supplying fluid to the interior of said chamber, bearing members for rotatably supporting said roller, and valve means for release of a fluid under pressure from within said chamber, the said means extending beyond the periphery and circumferentially distributed within the said periphery of said cylinder.

2. A roller for a printing press comprising a hollow roller, end walls on said roller to form therein a plenum chamber, a hollow shaft extending into said plenum chamber at least through one of said end walls to provide a means for entry of a gaseous fluid above atmospheric pressure into said chamber, bearing members on said shaft rotatably supporting said roller, the said roller having a periphery and apertures therein communicating with the said chamber, and fluid release means mounted within said apertures, projecting circumferentially beyond the said periphery of said roller whereby upon contact by a web they are depressed to permit escape of fluid from within the chamber.

3. In the roller of claim 2, wherein the said fluid release means is a pneumatic valve.

4. In the product of claim 3, wherein the said pneumatic valve comprises a valve insert fitting slidably in the apertures within the said rim, a vertical bore open at the top in the said insert extending for approximately a distance slightly greater than the thickness of said rim shell, a transverse bore extending from the side wall of said insert to the said vertical bore to provide a means for exit of a fluid through said valve insert, a head on said valve insert of a diameter slightly greater than that of said insert and a detent to keep said insert in juxtaposition within said aperture.

5. In the product of claim 4, wherein the said detent is an extensible spring lying athwart the aperture within the hollow roller.

6. In the product of claim 4, wherein the said detent is an annular rim formed by compression of the lowermost end of said insert.

7. In the product of claim 4, wherein said detent is a C-spring clamp engaging an annular groove formed in the selected portion of the lower section of said insert.

8. In the product of claim 4, wherein the said detent is a cotter pin extending through a hole laterally bored through the end of said valve insert.

9. A valve in combination with a roller, comprising a hollow roller, valve walls formed in preselected positions by boring holes through the rim shell of said hollow roller, forming a countersunk annular recess within the rim about the upper part of said aperture a valve insert having a shank of a diameter slightly less than diameter of said apertures and slidably engageable by the walls defining said apertures, a head on said shank larger than said shank and fitting within said countersunk annular recess, a vertical bore extending from top of said head through the said insert for a distance slightly greater than the thickness of the rim shell of the said hollow roller, a lateral bore extending at about right angles from said vertical bore through the side wall of said valve insert shank and a means to retain said valve insert in juxtaposition within the said walls formed by the aperture in the rim shell.

10. In the product of claim 9, wherein the surface of said head is grooved.

11. A roller for administering conditioning fluids to a surface of a rapidly moving web, comprising a hollow cylinder having therein a chamber, a means to support said cylinder, a means to provide access to said chamber within the said cylinder of a conditioning fluid under pressure through said support means, depressible projections

above the surface of said cylinder and spaced thereabout in a preselected pattern, the said projections comprising valve inserts, the said inserts having a shank nested slidably in an aperture formed within the shell of said cylinder, a head on said shank being wider than diameter of said shank and projecting above the surface of the periphery of the roller when the said chamber is under pressure, a zig-zag bore within said shank one end of said bore terminating in the said head, and other end terminating in the side wall of said shank, and a means to lock the said shank in slidable juxtaposition within the apertures of the shell of said cylinder whereby when the projections are depressed by a web, the shank and its bore are in direct communication with the gaseous fluid under pressure within the chamber and permit it to escape through said bore in the head directly against the web.

12. A printing press roller for drying quickly inks comprising a hollow tubular member, end enclosing supports for said tubular member to form therebetween a chamber, bearing members for rotatably supporting said chamber in contact with a moving web, a means for entry of air into the interior of said tubular chamber, a multiplicity of ball valve means set in within the perimeter



of said tubular member and in communication with the interior of said chamber, the balls of said valve means projecting slightly above the surface of said perimeter to provide a contactable surface for a continuous web passing thereover which will depress the said ball valves and allow air under pressure to escape about the said ball whereby freshly inked surfaces on the said web can dry more quickly.

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